

REMARKS

By this Amendment, claims 1, 8, 17, 18, 19, 20, 21, 26, and 27 are amended. Claim 7 has been canceled. No new claims have been added. Accordingly, after entry of this Amendment, claims 1-6 and 8-27 will remain pending.

Applicants would like to thank the Examiner for the indication of allowable subject matter in claims 7-18. Following the Examiner's lead, the Applicant has amended claim 1 to incorporate the subject matter formerly recited by claim 7. So that the remaining claim dependencies are consistent with this change, the Applicant has also amended claims 8, 17, and 18.

In making these amendments, the Applicant respectfully submits that the scope of claim 1 is now consistent with that of claim 7, as originally filed. Accordingly, while recognizing that the independent claim has been altered to incorporate the limitations of one of the claims indicated to be allowable, the Applicant respectfully submits that the scope of the claims has not been altered from the claim scope as originally presented when this application was filed. As such, the Applicant does not intend for the scope of claims 1-6 and 8-18 to be materially narrowed by the presentation of this Amendment, at least in so far as the application of the Doctrine of Equivalents is concerned. To the contrary, since the subject matter of these claims is consistent with the subject matter of the claims as originally filed (*i.e.*, the scope of claim 7), the Applicant respectfully submits that the claims are entitled to at least the same scope (available to claim 7) under the Doctrine of Equivalents as if the claims had not been altered.

In the Office Action dated August 9, 2004, the Examiner rejected claims 1-5 and 19 under 35 U.S.C. § 102(b) as anticipated by Otsubo et al. (U.S. Patent No. 4,808,258). Claims 1 and 6 were further rejected under 35 U.S.C. § 103(a) as being unpatentable over Otsubo et al. in view of Heinecke et al. (U.S. Patent No. 4,935,661). In view of the amendment to claim 1 to include the allowable subject matter of claim 7, the Applicant respectfully submits that these rejections have been rendered moot. Accordingly, the Applicant respectfully requests that the Examiner withdraw the rejections and pass claims 1-6 and 8-18 to issue.

In the Office Action, the Examiner also rejected claims 19, 20, 21, 23, 24, 26, and 27 under 35 U.S.C. § 103(a) as unpatentable over Otsubo et al. in view of Mahawili (U.S. Patent No. 4,993,358). Claim 22 was rejected under 35 U.S.C. § 103(a) as unpatentable over Otsubo

et al. in view of Mahawili, and further in view of Bates et al. ("Fast Gas Injection System for Plasma Physics," Rev. Sci. Instrum., Vol. 55, No. 6, June, 1984.) The Examiner rejected claim 25 under 35 U.S.C. § 103(a) as being unpatentable over Otsubo et al. in view of Mahawili, and further in view of Eres et al. (U.S. Patent No. 5,164,040). The Applicant respectfully disagrees with the Examiner's rejections of the claims and, therefore, respectfully traverses each of the rejections.

Among other changes, claim 19 has been amended to incorporate the limitations formerly recited by claim 20. In making these amendments, the Applicant respectfully submits that the scope of claim 19 is now consistent with that of claim 20, as originally filed. Accordingly, while recognizing that the independent claim has been altered to incorporate the limitations of one of the claims indicated to be allowable, the Applicant respectfully submits that the scope of the claims has not been altered from the claim scope as originally presented when this application was filed. As such, the Applicant does not intend for the scope of claims 20-27 to be materially narrowed by the presentation of this Amendment, at least in so far as the application of the Doctrine of Equivalents is concerned. To the contrary, since the subject matter of these claims is consistent with the subject matter of the claims as originally filed (*i.e.*, the scope of claim 20), the Applicant respectfully submits that the claims are entitled to at least the same scope (available to claim 20) under the Doctrine of Equivalents as if the claims had not been altered.

Claims 19-27 are patentably distinguishable over all of the references cited thereagainst because the claims are directed to a reactor for performing a plasma-assisted treatment on a substrate which combines a number of features including, for example, a gas injection assembly immediately proximate the plasma region, said gas injection assembly configured to introduce a first process gas into said chamber during a first time period and introduce a second process gas having a different composition than the first process gas during a second time period which follows the first time period. Contrary to the Examiner's assertion, none of the references, either alone or in combination disclose or suggest such a combination of features as presently recited by claims 19-27.

Otsubo et al. discusses a plasma processing method and apparatus for carrying out plasma processing. As correctly identified by the Examiner, Otsubo et al. fails to discuss or suggest a plasma processing apparatus with, *inter alia*, a gas injection system configured to introduce first and second process gases, with different compositions, in subsequent time periods. This deficiency, among others, is not remedied by the prior art.

Mahawili does not assist the Examiner in fashioning a rejection of the claims. Mahawili describes a chemical vapor deposition (CVD) reactor and method of operation of the CVD reactor. The reactor 10 includes annular gas manifolds 32-50, which are adapted for connection with one or more sources of reactant gases such as those schematically indicated at 56 and 58. (Mahawili at col. 4, lines 45-50.) Importantly, Mahawili discusses that “the two sources 56 and 58 indicate the possibility of combining two or more gases to form the reactant gas environment within the chamber 24.” (Mahawili at col. 4, lines 52-55.) In addition, Mahawili states: “Preferably, gases from both sources 56 and 58 are connected with certain of the external regulators to permit mixing of the gases to form the desired reactant gas within certain of the manifolds prior to introduction of the reactant gas into the chamber 24.” (Mahawili at col. 4, line 65, through col. 5, line 2.) Mahawili, however, is silent concerning the sequential introduction of first and second process gases as recited by the claims.

While the Examiner correctly identified that control valves 64 and 70 are present, they are used to open or close exhaust passages.

The control valves 64 and 70 are adapted for sequential operation, preferably by automated means (not shown) in order to selectively open or close the individual *exhaust passages 60 and 66* between the chamber 24 and vacuum means 72.

* * *

With reactant gas flowing into the chamber 24 through certain of [sic, of] the orifices 32A-50A, *the exhaust control valves 64 and 70 are operated sequentially* in order to develop or induce selected patterns of local flow vectors for reactant gases within the chamber and adjacent the substrate 22. . . .

(Mahawili at col. 5, lines 20-24, and at col. 6, lines 16-21; emphases added.) Accordingly, the Applicants respectfully submit that Mahawili merely discusses the combination of gases prior to their introduction into the reactor chamber and control over separate exhaust valves to control local gas flow of a single process gas. The Applicants respectfully point out that there is nothing in Mahawili to suggest a plasma processing apparatus with, *inter alia*, a gas injection system configured to introduce first and second process gases, with different compositions, in subsequent time periods. Accordingly, the Applicants respectfully submit that the references cannot be combined in the manner suggested by the Examiner and that the claims are patentable thereover.

With respect to the rejection of claim 22 under 35 U.S.C. § 103(a) as unpatentable over Otsubo et al. in view of Mahawili and further in view of Bates et al., the Applicants respectfully point out that Bates et al. is deficient at least for the same reasons that Otsubo et al. and Mahawili are deficient and, as a result, cannot be combined with the two references to render claim 22 obvious. Similarly, with respect to claim 25, Eres et al. also fails to supply at least the teaching(s) notably absent from Otsubo et al. and Mahawili. Accordingly, Eres et al. cannot be properly combined with the two references to render obvious claim 25.

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully Submitted,

PILLSBURY WINTHROP LLP

By: 

Jeffrey D. Karceski

Reg. No.: 35,914

Tel. No.: (703) 905-2110

Fax No.: (703) 905-2500

JDK/dlh

Customer No.: 00909

P.O. Box 10500

McLean, VA 22102

(703) 905-2000